

What is claimed is:

1. A method for processing a call in an asynchronous mobile communication system, wherein an asynchronous mobile station includes a call control (CC) entity, a mobility management (MM) entity and a radio resource controller (RRC); an asynchronous radio network includes a radio resource controller (RRC); and a synchronous core network is interlocked, the method comprising the steps of:

a) setting up the call in case a calling call message is generated in the mobile station;

b) establishing a channel between the asynchronous mobile station and the asynchronous radio network;

c) handling basic information for assigning a radio resource;

d) performing a cipher establishment;

e) establishing the radio resource;

f) performing a configuration for a service; and

g) transmitting a phone call stand-by message to a user.

2. The method as recited in claim 1, wherein the step a) includes the steps of:

a1) transmitting the calling call message generated in the CC entity of the asynchronous mobile station, to the RRC of the asynchronous mobile station;

a2) requesting the RRC of the asynchronous radio network of a connection, through a common control channel (CCCH); and

a3) transmitting a connection completion message and information of a dedicated control channel (DCCH), through the CCCH, to the asynchronous mobile station, after receiving the request of the connection.

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3. The method as recited in claim 2, wherein the step b) includes the steps of:

b1) establishing the DCCH that the asynchronous mobile station is required to use, based on the information of the DCCH received from the asynchronous radio network;

b2) transmitting information of the asynchronous mobile station capability, through the DCCH, to the asynchronous radio network;

b3) receiving a confirmation response of the information of the synchronous mobile station capability from the asynchronous radio network; and

b4) transmitting the calling call message, through the DCCH, to the asynchronous radio network.

20 4. The method as recited in claim 3, wherein the step c) includes the steps of:

c1) storing a necessary message from the calling call message in the asynchronous radio network;

25 c2) transmitting a message representing that the calling call is generated to the synchronous core network;

c3) transmitting information of a wire resource assignment and information of a radio resource assignment from

the synchronous core network to the asynchronous radio network;

c4) establishing the wire resource in the asynchronous radio network; and

5 c5) transmitting the basic information for assigning the radio resource to the asynchronous mobile station.

5. The method as recited in claim 4, wherein the step d) includes the steps of:

10 d1) selecting information of ciphering from the basic information for assigning the radio resource and storing the information of ciphering in the asynchronous mobile station; and

15 d2) transmitting a ciphering completion message to the asynchronous radio network.

6. The method as recited in claim 5, wherein the step e) includes the steps of:

20 e1) after receiving the ciphering completion message, transmitting basic information of the radio resource for establishing the radio resource to the asynchronous mobile station;

e2) storing the basic information of the radio resource in the asynchronous mobile station;

25 e3) establishing the radio resource, based on the stored information; and

e4) transmitting a radio resource establishment

completion message to the asynchronous radio network.

7. The method as recited in claim 6, wherein the step f) includes the steps of:

5 f1) after receiving the radio resource establishment completion message, transmitting information of a service configuration to the asynchronous mobile station;

f2) storing the information of the service configuration in the asynchronous mobile station; and

10 f3) completing the service configuration and then transmitting a service connect completion message to the asynchronous radio network.

8. The method as recited in claim 7, wherein the step g) includes the steps of:

15 after receiving the service connect completion message, transmitting the radio resource establishment completion message to the synchronous core network; and if the phone call stand-by message is received, transmitting the phone call
20 stand-by message to the asynchronous mobile station.

~~9.~~ A method for processing a call, when a call clear is initiated by an asynchronous mobile station in an asynchronous mobile communication system, wherein the asynchronous mobile
25 station includes a call control (CC) entity, a mobility management (MM) entity and a radio resource controller (RRC); an asynchronous radio network includes a radio resource

an asynchronous radio network includes a radio resource controller (RRC); and a synchronous core network is interlocked, comprising the steps of:

5 a) transmitting a message requesting that a radio resource and a wire resource need to be released, from the asynchronous mobile station to the asynchronous radio network;

b) transmitting a call clear request message from the asynchronous radio network to the synchronous core network;

10 c) transmitting a radio resource release message from the asynchronous radio network to the asynchronous mobile station, after receiving a command of a resource release from the synchronous core network;

d) at the asynchronous mobile station, releasing a radio resource for an exclusive use;

15 e) transmitting a radio resource release completion message for informing that the release of the radio resource for the exclusive use was completed, to the asynchronous radio network; and

20 f) transmitting a connection release message for informing that a Layer-3 signaling and a radio resource for a common use should be released, to the asynchronous mobile station; and

25 g) after at the asynchronous mobile station, releasing the Layer-3 signaling and the radio resource for the common use, transmitting a clear complete message for informing that all radio resources and signaling between the asynchronous mobile station were released, from the asynchronous radio

network to the synchronous core network.

10. A method for processing a call clear initiated by a synchronous core network in an asynchronous mobile communication system, wherein the asynchronous mobile station includes a call control (CC) entity, a mobility management (MM) entity and a radio resource controller (RRC); an asynchronous radio network includes a radio resource controller (RRC); and a synchronous core network is interlocked, comprising the steps of:

a) transmitting a radio resource release message from the asynchronous radio network to the asynchronous mobile station, after receiving a command of the resource release from the synchronous core network;

b) at the asynchronous mobile station, releasing a radio resource for an exclusive use, after receiving the radio resource release message from the asynchronous radio network;

c) transmitting a radio resource release completion message for informing that the release of the radio resource for the exclusive use was completed, from the asynchronous mobile station to the asynchronous radio network;

d) transmitting a connection release message for informing that a Layer-3 signaling and a radio resource for a common use should be released, to the asynchronous mobile station; and

e) after at the asynchronous mobile station, releasing the Layer-3 signaling and the radio resource for the common

use, transmitting a clear complete message for informing that all radio resources and signaling between the asynchronous mobile station were released, from the asynchronous radio network to the synchronous core network.

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11. A method for processing a handoff in an asynchronous mobile communication system including an asynchronous mobile station having a call control (CC) entity and a radio resource controller (RRC), a source asynchronous radio network having a radio resource controller (RRC), and at least one target asynchronous radio network having a radio resource controller (RRC), wherein a synchronous core network is interlocked, the method comprising the steps of:

a) determining to handoff;

b) selecting the target asynchronous radio network for the handoff;

c) in response to a handoff request, providing information related to the handoff, thereby completing a preparation for the handoff;

d) establishing a connection between the asynchronous mobile station and the target asynchronous radio network, thereby completing the handoff; and

e) disconnecting the communication between the asynchronous mobile station and the source asynchronous radio network.

12. The method as recited in claim 11, wherein the step

a) includes the steps of:

a1) at the asynchronous mobile station, measuring a power and a performance, et al., of a radio link, based on information related to a radio link measurement received from the source asynchronous radio network;

a2) transmitting a radio link measurement report message to the source asynchronous radio network; and

a3) at the source asynchronous radio network, determining whether the handoff is allowed, based on the radio link measurement report message.

13. The method as recited in claim 12, wherein the step b) includes the steps of:

b1) transmitting a handoff required message to the synchronous core network, if it is determined to handoff; and

b2) at the synchronous core network, grasping information about the target asynchronous radio network by analyzing the handoff required message.

14. The method as recited in claim 13, wherein the step c) includes the steps of:

c1) at the synchronous core network, transmitting a handoff request message to the target asynchronous radio network;

c2) at the target asynchronous radio network, analyzing and storing information about the source asynchronous radio network and the asynchronous mobile station, base on the

handoff request message;

c3) transmitting a handoff request acknowledgement message from the target asynchronous radio network to the synchronous core network, transmitting a handoff command message from the synchronous core network to the source asynchronous radio network, and transmitting a physical channel reconfiguration RRC message from the source asynchronous radio network to the asynchronous mobile station;

c4) transmitting a message for informing that the mobile station is prepared for the handoff, from the asynchronous mobile station to the source asynchronous radio network; and

c5) transmitting a handoff commenced message from the source asynchronous radio network to the synchronous core network.

15. The method as recited in claim 14, wherein the physical channel reconfiguration RRC message further contains the information about the target asynchronous radio network.

16. The method as recited in claim 14, wherein the step d) includes the steps of:

d1) performing an radio link establishment and a synchronization for the communication between the asynchronous mobile station and the target asynchronous radio network; and

d2) establishing a layer-3 signaling and a dedicated control channel (DCCH) between the asynchronous mobile station and the target asynchronous radio network.

17. The method as recited in claim 16, wherein the step e) includes the steps of:

5 e1) after receiving a message informing that the handoff is completed from the asynchronous mobile station, transmitting a handoff complete message from the target asynchronous radio network to the synchronous core network;

10 e2) transmitting a clear command message for releasing a wire resource and a radio resource of the source asynchronous radio network from the synchronous core network to the source asynchronous radio network;

15 e3) transmitting a message for informing that the radio resource should be released, from the source asynchronous radio network to the asynchronous mobile station;

20 e4) after, at the asynchronous mobile station, releasing a radio resource for an exclusive use, transmitting a radio resource release completion message, from the asynchronous mobile station to the source asynchronous radio network;

25 e5) at the asynchronous mobile station, releasing the layer-3 signaling and a radio resource for a common use, after receiving a radio resource controller connection release message from the source asynchronous radio network;

e6) transmitting a radio resource controller connection release complete message from the asynchronous mobile station to the source asynchronous radio network; and

e7) transmitting a clear complete message for informing that it is completed to release a connection between the

asynchronous mobile station and the source asynchronous radio network, from the source asynchronous radio network to the synchronous core network.

5 18. A method for processing a handoff in an asynchronous mobile communication system including an asynchronous mobile station and a source asynchronous radio network, wherein a synchronous core network and at least one target synchronous radio network are interlocked, the method comprising the steps of:
10 of:

 a) determining to handoff;
 b) selecting the target synchronous radio network for the handoff;

15 c) in response to a handoff request, providing information related to the handoff, thereby completing a preparation for the handoff;

 d) establishing a connection between the asynchronous mobile station and the target synchronous radio network, thereby completing the handoff; and

20 e) disconnecting the communication between the asynchronous mobile station and the source asynchronous radio network.

25 19. The method as recited in claim 18, wherein the step a) includes the steps of:

 a1) at the asynchronous mobile station, measuring a power and a performance, et al., of a radio link, based on

information related to the radio link measurement received from the source asynchronous radio network;

a2) transmitting a radio link measurement report message to the source asynchronous radio network; and

5 a3) at the source asynchronous radio network, determining whether the handoff is allowed, based on the radio link measurement report message.

20. The method as recited in claim 19, wherein the step
10 b) includes the steps of:

b1) transmitting a handoff required message to the synchronous core network, if it is determined to handoff; and

b2) at the synchronous core network, grasping information about the target synchronous radio network by analyzing the
15 handoff required message.

21. The method as recited in claim 20, wherein the step
c) includes the steps of:

c1) at the synchronous core network, transmitting a
20 handoff request message to the target Synchronous radio network;

c2) at the target Synchronous radio network, analyzing and storing information about the source asynchronous radio network and the asynchronous mobile station, based on the
25 handoff request message;

c3) at the target Synchronous radio network, assigning sources to the asynchronous mobile station, thereby connecting

to the call of the asynchronous mobile station;

c4) at the target Synchronous radio network, transmitting a null forward traffic channel frame to the asynchronous mobile station;

5 c5) transmitting a handoff request acknowledgement message from the target Synchronous radio network to the synchronous core network, transmitting a handoff command message from the synchronous core network to the source asynchronous radio network, and transmitting an inter system handover request RRC message from the source asynchronous
10 radio network to the asynchronous mobile station;

c6) transmitting a message for informing that the mobile station is prepared for the handoff, from the asynchronous mobile station to the source asynchronous radio network; and

15 c7) transmitting a handoff commenced message from the source asynchronous radio network to the synchronous core network.

20 22. The method as recited in claim 21, wherein the intersystem handover request RRC message further contains the information about the target Synchronous radio network.

23. The method as recited in claim 21, wherein the step d) includes the steps of:

25 d1) at the asynchronous mobile station, transmitting a reverse traffic channel frame and a traffic channel preamble to the target synchronous radio network; and

d2) performing an radio link establishment and a synchronization for the communication between the asynchronous mobile station and the target Synchronous radio network.

5 24. The method as recited in claim 23, wherein the step e) includes the steps of:

10 e1) after receiving a message informing that the handoff is completed from the asynchronous mobile station, transmitting a handoff complete message from the target Synchronous radio network to the synchronous core network;

15 e2) transmitting a clear command message in order to release a wire resource and a radio resource of the source asynchronous radio network from the synchronous core network to the source asynchronous radio network;

20 e3) transmitting a message for informing that the radio resource should be released, from the source asynchronous radio network to the asynchronous mobile station;

25 e4) after, at the asynchronous mobile station, releasing a radio resource for an exclusive use, transmitting a radio resource release completion message, from the asynchronous mobile station to the source asynchronous radio network;

 e5) at the asynchronous mobile station, releasing the layer-3 signaling and a radio resource for a common use, after receiving a radio resource controller connection release message from the source asynchronous radio network; and

 e6) transmitting a radio resource controller connection release complete message from the asynchronous mobile station

to the source asynchronous radio network; and

e7) from the source asynchronous radio network to the synchronous core network, transmitting a clear complete message for informing that it is completed to release a connection between the asynchronous mobile station and the source asynchronous radio network.

25. A method for processing a handoff in a synchronous mobile communication system including a synchronous mobile station and a source synchronous radio network, wherein a synchronous core network and at least one target asynchronous radio network are interlocked, the method comprising the steps of:

- a) determining to handoff;
- b) selecting a target asynchronous radio network for the handoff;
- c) in response to a handoff request, providing information related to the handoff, thereby completing a preparation for the handoff;
- d) establishing a connection between the synchronous mobile station and the target asynchronous radio network, thereby completing the handoff; and
- e) disconnecting the communication between the synchronous mobile station and the source synchronous radio network.

26. The method as recited in claim 25, wherein the step

a) includes the steps of:

a1) transmitting a message for requesting to measure a neighboring radio link, from the source synchronous radio network to the synchronous mobile station;

5 a2) at the synchronous mobile station, measuring a power and a performance, et al., of the neighboring radio link, based on information related to a neighboring radio link measurement received from the source synchronous radio network;

10 a3) transmitting a neighboring radio link measurement message to the source synchronous radio network; and

a4) at the source synchronous radio network, determining whether the handoff is allowed, based on the neighboring radio link measurement message.

15 27. The method as recited in claim 26, wherein the step b) includes the steps of:

b1) transmitting a handoff required message to the synchronous core network, if it is determined to handoff; and

20 b2) at the synchronous core network, grasping information about the target asynchronous radio network by analyzing the handoff required message.

25 28. The method as recited in claim 27, wherein the step c) includes the steps of:

c1) at the synchronous core network, transmitting a handoff request message to the target asynchronous radio

network;

c2) at the target asynchronous radio network, analyzing and storing information about the source synchronous radio network and the synchronous mobile station, base on the
5 handoff request message;

c3) transmitting a handoff request acknowledgement message from the target asynchronous radio network to the synchronous core network, transmitting a handoff command message from the synchronous core network to the source
10 synchronous radio network, and transmitting an extended handoff direction message or a general handoff direction message for requesting the handoff, from the source synchronous radio network to the synchronous mobile station;

c4) transmitting a message for informing that the mobile
15 station is prepared for the handoff, from the synchronous mobile station to the source synchronous radio network; and

c5) transmitting a handoff commenced message from the source synchronous radio network to the synchronous core network.

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29. The method as recited in claim 28, wherein the step d) includes the steps of:

d1) performing an radio link establishment and a synchronization for the communication between the synchronous
25 mobile station and the target asynchronous radio network; and

d2) establishing a layer-3 signaling and the DCCH between the asynchronous mobile station and the target asynchronous

radio network.

30. The method as recited in claim 29, wherein the step e) includes the steps of:

5 e1) after receiving a message informing that the handoff is completed, from the synchronous mobile station, transmitting a handoff complete message from the target asynchronous radio network to the synchronous core network;

10 e2) transmitting a clear command message for releasing a wire resource and a radio resource of the source synchronous radio network, from the synchronous core network to the source synchronous radio network;

15 e3) releasing all resources and signaling between the synchronous mobile station and the source synchronous radio network; and

20 e4) from the source synchronous radio network to the synchronous core network, transmitting a clear complete message for informing that it is completed to release a connection between the synchronous mobile station and the source synchronous radio network.

~~31.~~ A method for processing a handoff in an asynchronous mobile communication system including an asynchronous mobile station and a source asynchronous radio network and, wherein a synchronous core network and at least one target analog radio network are interlocked, the method comprising the steps of:

a) determining to handoff;

b) selecting the target analog radio network for the handoff;

c) in response to a handoff request, providing information related to the handoff, thereby completing a preparation for the handoff;

d) establishing a connection between the asynchronous mobile station and the target analog radio network, thereby completing the handoff; and

e) disconnecting the communication between the asynchronous mobile station and the source asynchronous radio network.

32. The method as recited in claim 31, wherein the step a) includes the steps of:

a1) at the asynchronous mobile station, measuring a power and a performance, et al., of a radio link, based on information related to the radio link measurement received from the source asynchronous radio network;

a2) transmitting a radio link measurement report message to the source asynchronous radio network; and

a3) at the source asynchronous radio network, determining whether the handoff is allowed, based on the radio link measurement report message.

33. The method as recited in claim 32, wherein the step b) includes the steps of:

b1) transmitting a handoff required message to the

synchronous core network, if it is determined to handoff; and

b2) at the synchronous core network, grasping information about the target analog radio network by analyzing the handoff required message.

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34. The method as recited in claim 33, wherein the step c) includes the steps of:

c1) at the synchronous core network, transmitting a handoff request message to the target analog radio network;

10 c2) at the target analog radio network, analyzing and storing information about the source asynchronous radio network and the asynchronous mobile station, based on the handoff request message;

15 c3) transmitting a handoff request acknowledgement message from the target analog radio network to the synchronous core network, in case the target analog radio network has a source to assign to the asynchronous mobile station and transmitting a handoff command message from the synchronous core network to the source asynchronous radio
20 network;

c4) transmitting a inter system handoff command RRC message from the source asynchronous radio network to the asynchronous mobile station;

25 c5) transmitting a message for informing that the mobile station is prepared for the handoff, from the asynchronous mobile station to the source asynchronous radio network; and

c6) transmitting a handoff commenced message from the

source asynchronous radio network to the synchronous core network.

35. The method as recited in claim 34, wherein the inter
5 system handoff command RRC message further contains the
information about the target analog radio network.

36. The method as recited in claim 34, wherein the step
d) includes the step of:

10 performing an radio link establishment, an initialization
of a vocoder and exchanging a signaling between the
asynchronous mobile station and the target analog radio
network.

15 37. The method as recited in claim 36, wherein the step
e) includes the steps of:

e1) transmitting a handoff complete message from the
target analog radio network to the synchronous core network;

20 e2) transmitting a clear command message for releasing a
wire resource and a radio resource of the source asynchronous
radio network from the synchronous core network to the source
asynchronous radio network;

25 e3) transmitting a message for informing that the radio
resource should be released, from the source asynchronous
radio network to the asynchronous mobile station;

e4) after, at the asynchronous mobile station, releasing
a radio resource for an exclusive use, transmitting a radio

resource release completion message, from the asynchronous mobile station to the source asynchronous radio network;

e5) at the asynchronous mobile station, releasing the layer-3 signaling and a radio resource for a common use, after receiving a radio resource controller connection release message from the source asynchronous radio network; and

e6) transmitting a radio resource controller connection release complete message from the asynchronous mobile station to the source asynchronous radio network; and

e7) transmitting a clear complete message for informing that it is completed to release a connection between the asynchronous mobile station and the source asynchronous radio network, from the source asynchronous radio network to the synchronous core network.